

Comparative Exergy and Economics Analysis of Hydrogen Storage Methods

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Hydrogen is drawing attention as one of the most promising energy storage mediums. Although it has high specific energy, it is challenging to store because of its small molecular size and low boiling point. An alternative technology should be searched due to its hazardous factor that hydrogen is mostly stored at a high pressure of 350–700bar. LOHC(Liquid Organic Hydrogen Carrier) is known as a hydrogen carrier that can store the hydrogen on liquid phase through hydrogenation reaction at room temperature and mild pressure. In this study, we performed exergy and economic analysis about representative hydrogen storage methods focused on LOHC. The analysis was carried out based on the boundary from hydrogen production using electric energy to storage and use. As a result, the compressed hydrogen storage method has superiority in energy and determination of hydrogen price in the current technical position. The hydrogen storage method using LOHC material need the solution for variable problem yet. However, the energy efficiency and transportation economics similar to the high-pressure storage method show the possibility of hydrogen storage using materials.